

EU TYPE EXAMINATION CERTIFICATE

n. IT-004-18-MI001-2213

Revision 3

Issued in accordance with the Directive 2014/32/EU of the European Parliament and Council of February 26, 2014 on measuring instruments (MID) and with the Italian decree n° 22/2007 as modified by decree n. 84/2016 of 2016 May 19, which implements the Directive 2014/32/EU (MID) and 2015/13/EU.

Issued by: **Parco Scientifico e Tecnologico del Lazio Meridionale Srl**
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Issued to: **ISOIL INDUSTRIA S.p.A.**
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Type of instrument: **Electromagnetic water meter**
Strumento

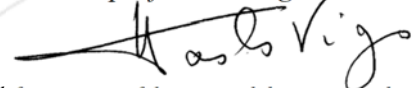
Type designation: **Sensors MS2500 DN25-DN250**
Modelli **Converters Model MV800**

Measurement of	water volume
MID Accuracy Class	Class I and class II according to R value
Environmental Class	M2 / E1-E2
Location	Open/Closed
Environmental Temperature Range	-25 ÷ +55 °C
Water temperature	5 ÷ 140 °C
Maximum admissible pressure	40 bar
Applicable essential requirements	Annex I and Annex III
Reference standards	ISO 4064:2014

Date of issue: **July 5th, 2019**
Data di emissione del certificato

Certificate valid until: **November 24th, 2027**
Certificato valido fino al

On behalf of the Chief Executive Officer
prof. Paolo Vigo



CLAUSES

The principal characteristics and the approval conditions are set out in the following appendix, which forms a part of the approval documents and consists of 9 pages. Partial publication or distribution of this report is forbidden without written approval of PA.L.MER. In accordance with the European Directive 2014/32/EU (MID), the manufacturer has to inform Pa.L.Mer. about any modifications, even if not significant, made or planned to be made to the above mentioned product. Any modifications made to the model without Pa.L.Mer. approval could invalidate the certificate. In case of new revisions of the certificate the latter version supersedes and reply the previous version.

Pa.L.Mer. società consortile a r.l.

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1. Design of the instrument

1.1. Construction, sensors and indication of the measurement results

The water meter family submitted to the present EU Type Examination is made up of an electromagnetic flanged water meter sensor MS2500 already MID approved (certificate CH-MI001-07007-01 issued by METAS NB 1259) based on the principle of electromagnetic induction. The coils present inside the tube create the magnetic field and two electrodes acquire a signal proportional to the speed of the water according Faraday law. A digital converter MV800 performs the signal processing function measurement and computer in order to count volume of cold and hot water. For further details refers to technical folder MV800+MS2500 rev.00. The family of water meters covers the nominal diameters in the range from 25-200 and consist in 10 nominal diameters for Accuracy Class 1 according ISO 4064-1:2014 and also in the range 25-250 (11 nominal diameters) for Accuracy Class 2 according ISO 4064-1:2014

All the properties of the water meter, whether mentioned or not, shall not be in conflict with the legislation.

1.2. Technical documentation folder

<i>Technical Description of the meter:</i>	Technical folder MV800 + MS2500 rev.00
<i>Installation and operation instructions:</i>	
<i>Sealing Plan:</i>	
<i>Drawing of the meter and dimension of the housing:</i>	

2. Technical data

2.1. Accuracy class 1 according ISO 4064-2:2014

DN	R	Q4	Q3	Q2	Q1	ORIENTATION	DISTURBANCE
	<i>Q3/Q1</i>	<i>m³/h</i>	<i>m³/h</i>	<i>m³/h</i>	<i>m³/h</i>		
25	100	20	16	0,256	0,160	H/V	U0/D0
32	100	31	25	0,400	0,250	H/V	U0/D0
40	100	50	40	0,640	0,400	H/V	U0/D0
50	100	79	63	1,008	0,630	H/V	U0/D0
65	100	125	100	1,600	1,000	H/V	U0/D0
80	100	200	160	2,560	1,600	H/V	U0/D0
100	100	313	250	4,000	2,500	H/V	U0/D0
125	100	500	400	6,400	4,000	H/V	U0/D0
150	100	788	630	10,08	6,300	H/V	U0/D0
200	63	788	630	16,00	10,00	H/V	U0/D0

The MPE for the upper flow rate zone ($Q_2 \leq Q \leq Q_4$) is ± 1 %, for temperatures from 0.1 °C to 30 °C, and ± 2 % for temperatures greater than 30 °C.

The MPE for the lower flow rate zone ($Q_1 \leq Q < Q_2$) is ± 3 % regardless of the temperature range



2.2. Accuracy class 2 according ISO 4064-2:2014

DN	R	Q4	Q3	Q2	Q1	ORIENTATION	DISTURBANCE
	$Q3/Q1$	m^3/h	m^3/h	m^3/h	m^3/h		
25	160	20	16	0,160	0,100	H/V	U0/D0
32	160	31	25	0,250	0,156	H/V	U0/D0
40	160	50	40	0,400	0,250	H/V	U0/D0
50	160	79	63	0,630	0,394	H/V	U0/D0
65	160	125	100	1,000	0,625	H/V	U0/D0
80	160	200	160	1,600	1,000	H/V	U0/D0
100	160	313	250	2,500	1,563	H/V	U0/D0
125	160	500	400	4,000	2,500	H/V	U0/D0
150	160	788	630	6,30	3,938	H/V	U0/D0
200	80	788	630	12,60	7,88	H/V	U0/D0
250	40	788	630	25,20	15,75	H/V	U0/D0

The MPE for the upper flow rate zone ($Q2 \leq Q \leq Q4$) is ± 2 %, for temperatures from 0.1°C to 30 °C, and ± 3 % for temperatures greater than 30 °C.

The MPE for the lower flow rate zone ($Q1 \leq Q < Q2$) is ± 5 % regardless of the temperature range.

2.3. Initial verification requirements

The water meter shall be tested at the end of the manufacturing process according to OIML R 49-1:2013 (E) §7.3 Initial verification. Ensure that working water temperature range is as follows:

T30, T50, 20 °C \pm 10 °C;

1.0 $Q1 \leq Q \leq 1.1 Q1$

1.0 $Q2 \leq Q \leq 1.1 Q2$

0.9 $Q3 \leq Q \leq 1.0 Q3$

The error indications determined at each of the above flow rates shall not exceed the maximum permissible errors. If all the error indication show the same sign, at least one of the errors shall not exceed one half of the maximum permissible error. The initial verification can be performed with testing equipment that perform volumetric or gravimetric (static or dynamic) measurement principle. The testing equipment must remain in the range of flow rates mentioned in the “Technical specifications”.

2.4. Setting to work requirements.

The water meters do not require a straight run of pipe either upstream or downstream, nor a flow conditioner.

3. Software specification

The legally relevant software version can be visualized on display on menu 12- function Firmware Info. The application software is stored in the processor memory. The meter has a unique software identification for the metrologically relevant part, each modification will be identified by a new version code, incremented by a progression of the last digit. Anytime a new software version has been released by the manufacturer it need to be approved by NB Pa.L.Mer.

Software type	P
Software Version	1.01.0014.XXXX (CRC : 7F69A609)
Risk Class	C
Extension	I1



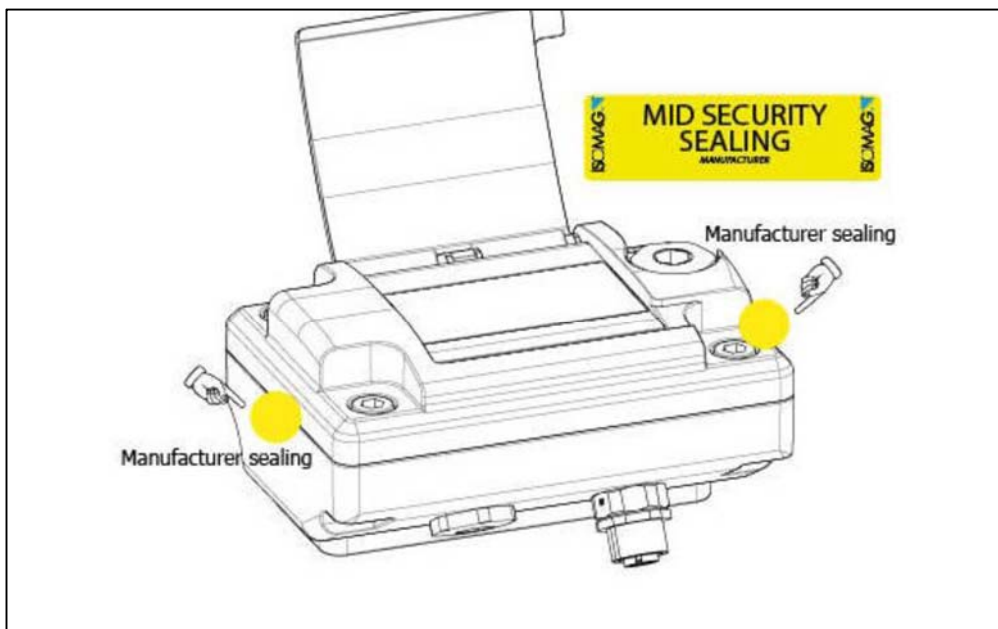
Completeness and correctness of software structure submitted for type evaluation (requirements of Welmec 7.2):

- Yes
- No

Remarks: None

4. Security sealing

The flow meter have to be provided in order to prevent any unauthorized manipulation of the meter, of a key software protection. For each flow meter manufactured only one key is calculated. It is not permitted to issue this key to the final utilizer. The converter case of the meters are sealed as follows:



N° 2 adhesive MID label are applied in the points as shown here above. For further details see Fascicolo tecnico MV800 + MS2500 rev.00.

The legalization plan is compliant to the requirements of Welmec 3.11



5. Labeling and inscriptions

The label contains the following MID requested inscriptions according ISO 4064-1:2017 par 6.6., as shown in Figure 2:

- a) Unit of measurement
- b) MID Accuracy Class
- c) Q₃
- d) R
- e) EU Type Certification Number
- f) Name of the manufacturer, and his trade mark
- g) Year of manufacture
- h) Serial number
- i) Direction of flow
- j) Max. admissible working pressure
- k) Operating position letter
- l) Temperature class
- m) Water meter model
- n) Identification number of the notified body for module D
- o) Voltage and frequency external power supply
- p) Environmental classification
- q) Electromagnetic environmental class

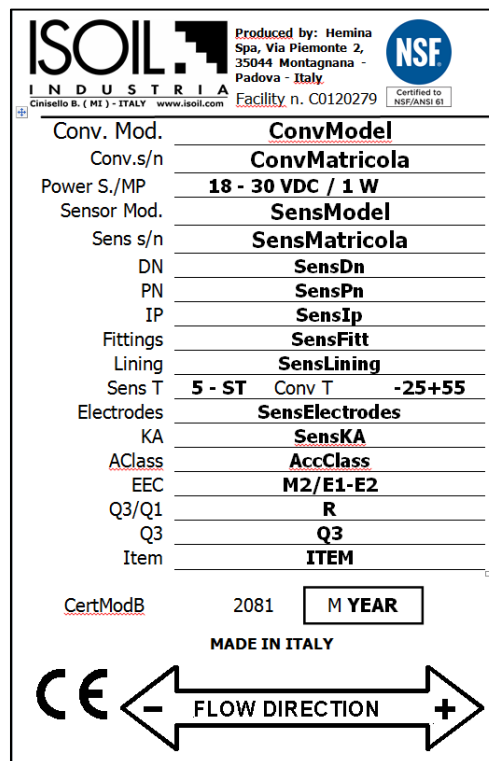


Figure 2 – Metrological label MV800 – Sensor MS2500



6. Pattern evaluation test

6.1. Tests performed

The meter has been submitted to the following tests, according to the main applicable parts of ISO 4064:2014. The above performed test has been selected according to the technical evaluation of the previous MID certification issued by METAS NB 1259 certificate n° CH-MI001-07007-01.

Test	Ref. ISO 4064-2
External examination	6.0
Error of indication	7.4
Absence of flow	8.17
Mains voltage variations	8.5.2
Mains frequency variations	8.5.2
Low voltage of internal battery (not connected to the mains power)	8.5.3
AC mains voltage dips, short interruption voltage variations	8.8
Burst on signal, data and control lines	8.9
Burst (transionet) on AC and DC mains	8.10
Electrostatic discharge	8.11
Radiated electromagnetic fields	8.12
Conducted electromagnetic fields	8.13
Surges on signal, data and control lines	8.14
Surges on AC and DC mains power lines	8.15

6.2. Check list for water meter examinations

External examination for all water meters				
OIML R 49-1:2013, subclause	Requirement	+	-	Remarks
<i>Function of the indicating device</i>				
6.7.1.1	The indicating device shall provide an easily read, reliable and unambiguous visual indication of the indicated volume	X		
6.7.1.1	The indicating device shall include visual means for testing and calibration.	X		High resolution scale interval
6.7.1.1	The indicating device may include additional elements for testing and calibration by other methods, e.g. for automatic testing and calibration	X		PULSE OUTPUT
<i>Unit of measurement and its placement</i>				
6.7.1.2	The indicated volume of water shall be expressed in cubic meters	X		
6.7.1.2	The symbol m ³ shall appear on the dial or immediately adjacent to the numbered display	X		
<i>Indicating range</i>				
6.7.1.3	For $Q_3 \leq 6.3$, the minimum indicating range is 0 m ³ to 9 999 m ³	n.a.	n.a.	
6.7.1.3	For $6.3 < Q_3 \leq 63$, the minimum indicating range is 0 m ³ to 99 999 m ³	X		99 999,9999 m ³
6.7.1.3	For $63 < Q_3 \leq 630$, the minimum indicating range is 0 m ³ to 999 999 m ³	X		999 999,999 m ³
6.7.1.3	For $630 < Q_3 \leq 6 300$, the minimum indicating range is 0 m ³ to 9 999 999 m ³	X		9 999 999,99 m ³



<i>Color coding for indicating device</i>				
6.7.1.4	The color black should be used to indicate the cubic metre and its multiples	n/a	n/a	Monochrome graphical display
6.7.1.4	The color red should be used to indicate sub-multiples of a cubic metre	n/a	n/a	Monochrome graphical display
6.7.1.4	The colors shall be applied to either the pointers, indexes, numbers, wheels, discs, dials or aperture frames	n/a	n/a	Monochrome graphical display
6.7.1.4	Other means of indicating the cubic metre may be used provided there is no ambiguity in distinguishing between the primary indication and alternative displays, e.g. sub-multiples for verification and testing	n/a	n/a	Monochrome graphical display
<i>Types of indicating device: Type 1 — Analogue device</i>				
6.7.2.1	The indicated volume shall be shown by continuous movement of either: a) one or more pointers moving relative to graduated scales; or b) one or more circular scales or drums each passing an index	n/a	n/a	
6.7.2.1	The value expressed in cubic meters for each scale division shall be of the form 10^n , where n is a positive or a negative whole number or zero, thereby establishing a system of consecutive decades.	n/a	n/a	
6.7.2.1	The scale shall be graduated in values expressed in cubic meters or accompanied by a multiplying factor ($\times 0.001$; $\times 0.01$; $\times 0.1$; $\times 1$; $\times 10$; $\times 100$; $\times 1\,000$ etc.)	n/a	n/a	
6.7.2.1	Rotational movement of the pointers or circular scales shall be clockwise	n/a	n/a	
6.7.2.1	Linear movement of pointers or scales shall be left to right	n/a	n/a	
6.7.2.1	Movement of numbered roller indicators shall be upwards	n/a	n/a	
<i>Types of indicating device: Type 2 — Digital device</i>				
6.7.2.2	The indicated volume is given by a line of digits appearing in one or more apertures	n/a	n/a	Monochrome graphical display
6.7.2.2	The advance of one digit shall be completed while the digit of the next immediately lower decade changes from 9 to 0	n/a	n/a	Monochrome graphical display
6.7.2.2	The apparent height of the digits shall be at least 4 mm	X		
6.7.2.2	For non-electronic devices, movement of numbered roller indicators (drums) shall be upwards	n/a	n/a	Monochrome graphical display
6.7.2.2	For non-electronic devices, the lowest value decade may have a continuous movement, the aperture being large enough to permit a digit to be read without ambiguity	n/a	n/a	Monochrome graphical display
6.7.2.2	For electronic devices with non-permanent displays the volume shall be able to be displayed at any time for at least 10 s	X		
6.7.2.2	For electronic devices, the meter shall provide visual checking of the entire display which shall have the following sequence: — for seven segment type displaying all the elements (e.g. an “eights” test); and — for seven segment type blanking all the elements (a “blanks” test). For graphical displays, an equivalent test is required to demonstrate that display faults cannot result in any digit being misinterpreted. Each step of the sequence shall last at least 1 s	X		Monochrome graphical display
<i>Types of indicating device: Type 3 — Combination of analogue and digital devices</i>				
6.7.2.3	The indicated volume is given by a combination of type 1 and type 2 devices and the respective requirements of each shall apply	n/a	n/a	
<i>Verification devices — General requirements</i>				
6.7.3.1	Every indicating device shall provide means for visual, non-ambiguous verification testing and calibration	X		
6.7.3.1	The visual verification may have either a continuous or a discontinuous movement	X		LOWER SIGNIFICANT DIGIT OF INDICATION
6.7.3.1	In addition to the visual verification display, an indicating device may include provisions for rapid testing by the inclusion of complementary elements (e.g. star wheels or discs), providing signals through externally attached sensors.	X		PULSE OUTPUT
<i>Verification devices — Visual verification displays</i>				
6.7.3.2.1	The value of the verification scale interval, expressed in cubic meters, shall be of the form: 1×10^n , 2×10^n or 5×10^n , where n is a positive or negative whole number, or zero	X		
6.7.3.2.1	The indicated volume is given by a line of digits appearing in one or more apertures	n/a	n/a	
6.7.3.2.1	For analogue or digital indicating devices with continuous movement of the first	n/a	n/a	



	element, the verification scale interval may be formed from the division into 2, 5 or 10 equal parts of the interval between two consecutive digits of the first element. Numbering shall not be applied to these divisions			
6.7.3.2.1	For digital indicating devices with discontinuous movement of the first element, the verification scale interval is the interval between two consecutive digits or incremental movements of the first element	n/a	n/a	
6.7.3.2.2	On indicating devices with continuous movement of the first element, the apparent scale spacing shall be not less than 1 mm and not more than 5 mm	n/a	n/a	
6.7.3.2.2	The scale shall consist of either: a) lines of equal thickness not exceeding one quarter of the scale spacing and differing only in length; or b) contrasting bands of a constant width equal to the scale spacing	n/a	n/a	
6.7.3.2.2	The apparent width of the pointer at its tip shall not exceed one- quarter of the scale spacing and in no case shall it be greater than 0.5 mm	n/a	n/a	
Resolution of the indicating device				
6.7.3.2.3	The sub-divisions of the verification scale shall be small enough to ensure that the resolution of the indicating device does not exceed 0.25 % of the actual volume for accuracy class 1 meters, and 0.5 % of the actual volume for accuracy class 2 meters, for a 90 min test at the minimum flow rate, Q_1 . <i>Note 1:</i> When the display of the first element is continuous, an allowance should be made for a maximum error in each reading of not more than half of the verification scale interval. <i>Note 2:</i> When the display of the first element is discontinuous, an allowance should be made for a maximum error in each reading of not more than one digit of the verification scale	X		
<i>Note:</i> For combination meters with two indicating devices, the above requirements apply to both indicating devices.				
Marks and inscriptions				
6.6.1	A place shall be provided on the meter for affixing the verification mark, which shall be visible without dismantling the meter	X		
6.6.2	The water meter shall be clearly and indelibly marked with the information listed in the following, either grouped or distributed on the casing, the indicating device dial, an identification plate or on the meter cover if is not detachable	X		
6.6.2 a)	Unit of measurement: cubic meter	X		
6.6.2 b)	The accuracy class, where it differs from accuracy class 2	X		
6.6.2 c)	The numerical value of Q_3 and the ratio Q_3/Q_1 (may be preceded by R). If the meter measures reverse flow and Q_3 and the ratio Q_3/Q_1 are different in the two directions, both values of Q_3 and Q_3/Q_1 shall be inscribed; the direction of flow to which each pair of values refers shall be clear. If the meter has different values of Q_3/Q_1 in horizontal and vertical positions, both values of Q_3/Q_1 shall be inscribed, and the orientation to which each value refers shall be clear	X		Only forward flow
6.6.2 d)	The type approval sign according to national regulations	X		
6.6.2 e)	The name or trademark of the manufacturer	X		
6.6.2 f)	The year of manufacture (or the last two digits of the year of manufacture or the month and year of manufacture)	X		
6.6.2 g)	The serial number (as near as possible to the indicating device)	X		
6.6.2 h)	The direction of flow (shown on both sides of the body; or on one side only, provided the direction of flow arrow is easily visible under all circumstances)	X		
6.6.2 i)	The maximum admissible pressure (MAP) if it exceeds 1 MPa (10 bar) or 0.6 Mpa (6 bar) for nominal diameter ≥ 500 mm. (The unit bar may be used where national regulations permit)	X		
6.6.2 j)	The letter V or H, if the meter can only be operated in the vertical or horizontal position	X		
6.6.2 k)	The temperature class where it differs from T30	X		
6.6.2 l)	The pressure loss class where it differs from Δp 63	X		
6.6.2 m)	The installation sensitivity class where it differs from U0/D0	X		
Additional markings for water meters with electronic devices				
6.6.2 n)	For an external power supply: the voltage and frequency	X		
6.6.2 o)	For a replaceable battery: the latest date by which the battery shall be replaced	n/a	n/a	
6.6.2 p)	For a non-replaceable battery: the latest date by which the meter shall be replaced	n/a	n/a	



6.6.2 q)	Environmental classification	X		
6.6.2 r)	Electromagnetic environmental class	X		
Protection devices				
6.8.1	Water meters shall include protection devices which can be sealed so as to prevent, both before and after correct installation of the water meter, dismantling or modification of the meter, its adjustment device or its correction device, without damaging these devices. In the case of combination meters, this requirement applies to both meters	X		
Protection devices — Electronic sealing devices				
6.8.2.1	When access to parameters that influence the determination of the results of measurements is not protected by mechanical sealing devices, the protection shall fulfil the following provisions. a) Access shall only be allowed to authorized people, e.g. by means of a code (password) or of a special device (hard key, etc.). The code shall be capable of being changed.	X		
	b) It shall be possible for at least the last intervention to be memorized. The record shall include the date and a characteristic element identifying the authorized person making the intervention [see a)]. If it is possible to memorize more than one intervention and if a previous intervention requires deletion to permit a new record, the oldest record shall be deleted			
6.8.2.2	For meters with parts which can be disconnected one from another by the user and which are interchangeable, the following provisions shall be fulfilled: a) it shall not be possible to access parameters that participate in the determination of results of measurements through disconnected points unless the provisions of OIML R 49-1:2013, 6.8.2.1 are fulfilled; b) interposing any device which may influence the accuracy shall be prevented by means of electronic and data processing securities or, if this is not possible, by mechanical means	n/a	n/a	
6.8.2.3	For meters with parts which may be disconnected one from the other by the user and which are not interchangeable, the provisions in OIML R 49-1:2013, 6.8.2.2 apply. Moreover, these meters shall be provided with devices which do not allow them to operate if the various parts are not connected according to the approved type. <i>Note:</i> Disconnections which are not allowed to the user may be prevented, e.g. by means of a device that prevents any measurement after disconnecting and reconnecting	n/a	n/a	
Examination and testing of checking facilities				
General requirements for examining checking facilities				
5.1.3	Water meters with electronic devices shall be provided with the checking facilities specified in OIML R 49-1:2013, Annex B, except in the case of non-resettable measurements between two constant partners	X		non-resettable measurements
5.1.3	All meters equipped with checking facilities shall prevent or detect reverse flow, as laid down in OIML R 49-1:2013, 4.2.7.	X		

7. Certificate revisions

Revision No	Issued on	Revision description
1	14/09/2018	First issue
2	26/03/2019	new CRC version
3	05/07/2019	New software version